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NEGOTIATING U.S.-U.S.S.R. JOINT VENTURES:

Enlisting Computer Models as Aids in the Process

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INTRODUCTION

Negotiation is becoming extremely sophisticated. Public organizations and large constituencies are frequently involved. The interests of parties are more technologically complex and geographically dispersed. There is an explosion of knowledge and information affecting the parties, their interests, and their positions (Sebenius, 1981; Nyhart & Samarasan, 1987). These changes are nowhere more evident than in the international business arena. Corporations with multinational operations span oceans in their reach for resources and productivity, and citizens everywhere are affected by the trade in real goods and services, financial instruments, currency, and even labor. An interesting twist in the story has developed in recent years, with the warming of relations between the Soviet Union and the United States. The new openness and *rapprochement* between East and West have led, in the Soviet Union, to significant policy changes.

In January, 1987, the Council of Ministers of the Soviet Union enacted a new law authorizing and encouraging the formation of commercial joint ventures between Soviet enterprises and foreign capitalist corporations (Carpenter & Smith, 1987). The Soviet Union was one of the last major communist countries to permit joint ventures with the West. Yugoslavia permitted these ventures in 1967, followed by Rumania in 1971, Hungary in 1972, Poland in 1976, Vietnam in 1977, China in 1979 and Bulgaria in 1980 (Carpenter & Smith, 1987; Lebkowsli & Monkiewicz, 1986; Jansen, 1980). The experience in these other nations has been mixed, and so there is still sufficient uncertainty about the prospects for effective commercial cooperation in the Soviet Union. Consequently, there is no great rush by Western firms into the Soviet Union, but a handful are currently negotiating or concluding agreements with the Soviets (Barringer, 1988).

In this paper, we first introduce the concept of negotiation management, in which computer models are used as aids in complex negotiation. We then focus on our context for this paper: U.S.-U.S.S.R. joint venture negotiations. We compare the cooperative joint venture with other strategic alternatives available to firms contemplating an expansion into international markets. Next, we review the legal framework that conditions the involvement of Western firms in joint ventures with Soviet enterprises, and proceed to enumerate and discuss various strategic implications, including economic, military, and political considerations. After that, we describe, in general terms, the objectives and interests of parties seeking an East-West joint venture, and analyze the major issues to be negotiated in the formation and operation of such a venture. We then introduce two computer modeling tools and show how they might be useful in U.S.-U.S.S.R. joint venture negotiation management, both in theory and in practice.

COMPUTER MODELING AND NEGOTIATION MANAGEMENT

Negotiation management is, in essence, the application of computer models and related technology to a collaborative effort at dispute resolution (Nyhart & Samarasan, 1987). In this paradigm, negotiation is treated as a communicative and knowledge-intensive group problem-solving process. Easily accessible techniques are being developed for modeling both the process and substance of negotiation. In addition, tools are being designed for negotiators to use in risk and decision analysis, optimization, and precedent analysis. Combining these and other computer-based modeling techniques, negotiation management is an integrated framework for dealing with complex negotiations, and is particularly appropriate in contexts where:

1) the points of dispute are technical, and involve a high degree of uncertainty;
2) practical experimentation with solutions is too expensive or risky;
3) there is no unquestioned authority to whom the disputing parties all defer; and
4) prompt resolution and a return to friendly, or at least stable, relations, are desired.

In this paper, "complex negotiations" are negotiations among several parties about numerous issues. The issues may be independent, but more commonly they are naturally coupled. They are "technical" in the sense that they spring from specialized scientific or technological controversy. Contemporary examples of technical problems in negotiation include U.S.-U.S.S.R. arms reduction, the economic effect of restrictive tariffs and quotas, and the siting of nuclear power plants. When proposals are made in negotiations over these issues, they cannot be tested in the real world, and structural problems in those proposals due to incomplete or inaccurate knowledge cannot be exposed immediately. When no obvious and constructive settlement presents itself, the absence of an *unquestioned authority* forces the parties to negotiate under uncertainty. And in most of these cases, *prompt resolution* is rare. The typical alternatives to negotiation—either doing nothing, or calling in the litigation experts—are usually costly, lead to extended stalemate, and can be disastrous in the long run.

A far better course in complex negotiations is for the parties to focus first on the removal of as much of the uncertainty as is feasible. They can then proceed to treat the negotiation as a *joint problem-solving process*. Technology, in the form of computers, computer models, and related tools, can be a very powerful aid in this process. When realistic and efficient solution alternatives have been identified through the building and manipulation of models, then intelligent compromise is possible.

Several analyses of the potential of the computer in negotiation have been made. Most recently, Samarasan (1988) lists five trends in modern negotiations that make the computer particularly useful:

1) negotiation problems are increasing in scientific and technological complexity;
2) larger problems affect and involve more parties, interest groups, and constituencies;
3) many negotiations result in temporary solutions and need to be repeated;
4) emerging national and global issues must be treated thoroughly and efficiently; and
5) change is accelerating and highlighted by the so-called "information explosion."

Given this background, one can embark on a more detailed exploration of the application of computers and models in negotiation. In order to address effectively the problems identified above, computer models designed for use in negotiation management would provide at least the following functional capabilities (Samarasan, 1988):

1) dynamic simulation of the process of negotiation;
2) dynamic simulation of the substance under negotiation;
3) channels for communication and experimentation;
4) analysis of similar precedential disputes and negotiations;
5) risk and decision analysis;
6) provision of expert knowledge and guidance;
7) enhancement and optimization of settlements;
8) modular links to a variety of additional tools; and
9) system-wide model configuration management.

In this paper, the use of two of these capabilities—dynamic substantive simulation and decision analysis—is described and analyzed in the context of U.S.-U.S.S.R. joint venture negotiation.

JOINT VENTURES AS A FORM OF INDUSTRIAL COOPERATION

The economic development of the newly industrialized nations of the Far East, and the emergence of Japan as a leading world economic power, are changing the nature of business. National markets are rapidly giving way to international markets. Goods and services are no longer procured solely from national firms, owned and operated by natives. Rather, goods and services are obtained from the most competitive sources available, be they national, foreign, or international firms (Cherin & Combs, 1983).

Historically, trade has been the primary mechanism through which new products and services were exchanged between nations. Today, trade remains the most common form of commercial contact

between East and West, often carried out through distributors or agents situated in the local market. In some circumstances, however, trade is too cumbersome or inefficient, and direct foreign investment is used to bring new products and services to market. In the planned economies of the East, however, direct foreign investment is not permitted, for obvious ideological reasons.

Increasingly more common in the East, and around the world, are industrial cooperation arrangements (Morris & Hergert, 1987; Killing, 1983). These frequently involve negotiated relationships which extend beyond the simple sale of products and services, continuous and close contacts between trading partners, the transfer of technology, and extensive training and technical assistance programs (Morris & Hergert, 1987; Hamel, Doz & Prahalad, 1986). Examples of East-West industrial cooperation include *co-production arrangements*, where a local enterprise will often assemble products from the components supplied by a Western firm; *licensing arrangements*, where technology and technical support services are transferred to state enterprises, accelerating the state's indigenous technical progress and enhancing its potential export capability; *sub-contracting*, where the existing capabilities of the host nation are used to procure parts and components for final assembly into Western-manufactured products; *turnkey arrangements*, where whole production systems, including plant equipment, technology, and technical assistance, are transferred to the host nation, usually in exchange for payment in the units produced by the plant; and, lastly, *joint ventures*, where partners from the East and West with a community of interest join together to work in a single or narrow area, the Western partner characteristically contributing technology, technical assistance, and financial support, and the Eastern partner contributing new or existing production facilities, low-cost labor and access to the local market (Ross, 1987; Jansen, 1980; U.S. Congressional Office of Technology Assessment, 1979; Pedersen, 1975).

Clearly, joint ventures are at one end of today's industrial cooperation spectrum. From this point of view, joint ventures are only the most recent means of trade between the Soviet Union and the West, and acknowledge and emphasize a continuing, consensual relationship among the partners.

THE LEGAL CONTEXT

Joint ventures in most countries take the form of a contractual arrangement between the parties, similar to a partnership or a limited liability corporation (Cherin & Combs, 1983). The Soviet joint venture law provides for the establishment of a "limited liability enterprise," the word "corporation" not being used for presumably ideological reasons. Joint venture "enterprises" created under this law are subject to at least three levels of legal regulation.

First, a joint venture in the Soviet Union is undeniably a creature of the Soviet legal system. It is subject to the Soviet joint venture law and to all other Soviet legislation unless specifically exempted. Soviet laws impose, for example, limitations on the maximum investment placed by foreign participants in a joint venture, on the venture's access to foreign currency, on the rights of the venture to buy or sell in the domestic market, and on the labor practices that must be followed by the venture. Ventures are exempt from certain other Soviet legislation, most importantly legislation relating to state planning requirements. But because there is no *corpus* of settled corporate law in the Soviet Union, it is still not clear whether the parties to a joint venture will have flexibility in structuring their transactions. Much remains to be seen, and will depend upon the interpretations given to the new joint venture law by the Soviet bureaucracies (Carpenter & Smith, 1987).

The foreign partner(s) in a joint venture would be subject to the laws of their own nations. By extension, the joint venture itself may also be subject to the extra-territorial application of those laws. Laws and regulations with extra-territorial reach typically include export control restrictions, anti-trust laws, tax laws, and (in the case of a U.S. partner) the Foreign Corrupt Practices Act (Ross, 1987; Overman, 1985; Cherin and Combs, 1983).

Lastly, there is a small body of international public law that may apply to the establishment and operation of a joint venture, through the action of various international treaties and conventions. For instance, both the U.S. and the Soviet Union are parties to the Convention on the Recognition and Enforcement of Foreign Arbitral Awards, and are committed to abide by its regulations (Jones, Day, Reavis, & Pogue, 1987).

And yet, despite the application of the laws of two or more nations to the joint venture and to the conduct of one or more of its participants, there remains a large domain of issues and interests that are not addressed by the explicit legal framework. In this domain, where possible solutions are not pre-empted or constrained by the applicable legal systems, private ordering through voluntary negotiation provides the means for the partners in a joint venture to establish rules to govern their future conduct.

As one precaution, for example, the joint venture agreement might require the venture to procure critical parts or technology from one or more partners. If other terms of the agreement are then breached by a partner, the supply of parts or the further transfer of technology could be stopped until the breach is compensated. Another precaution that might prevent violation and provide stability to an agreement would be to stipulate a schedule of liquidated damages, thus establishing clearly the potential costs of non-performance. Similarly, a provision to terminate the joint venture in the event that one of the partners commits a particularly egregious act may effectively secure performance where it would otherwise be uncertain (Cherin & Combs, 1983). By establishing such precautionary measures through negotiation, the parties to a joint venture could create a consensual and inter-dependent relationship which would permit each party to do better through jointly decided action than it could do alone.

Within the U.S. and most other industrialized nations, private consensual negotiation is relatively effective: in the event of a violation of the negotiated agreement, the damaged party has, ultimately, a right of legal recourse against the breaching party. But how effective is a consensual arrangement between an organ of a sovereign nation and its private foreign partner(s)? Given differences in ideology and in the political, legal, and economic structure, the various participants in an East-West joint venture may feel uncomfortable applying the laws of any one partner's nation in the event of a future conflict. If a Western partner has to rely on the Soviet courts for the enforcement of the joint venture agreement, there may well be legitimate reason for concern. Similarly, a state organization of the Soviet Union might have qualms about submitting itself to the unfamiliar business laws of a Western nation. The solution to the problem of legal recourse is itself a matter for negotiation, and may involve trade-offs among choice of law, choice of forum, and choice of dispute resolution mechanism.

One acceptable middle ground for the parties may be the explicit choice of the laws of some neutral third country to apply in the event that a conflict arises in the future. However, this choice may not always be enforceable. As explained earlier, the Soviet joint venture law specifically requires the application of Soviet laws to the venture unless specifically exempted. The difficulty arises where there is no Soviet law to apply: in such situations, it is not clear whether the Soviet member in the joint venture is permitted to submit itself to the laws of some arbitrarily chosen third country.

Another means of recourse, and the one most often used to resolve enforcement problems in joint venture conflicts, is for the parties to agree beforehand to resolve future disputes through arbitration in a neutral country such as Sweden or Switzerland, and to apply the procedures of a recognized agency such as the International Chamber of Commerce. Arbitration avoids the necessity of instituting legal action in a foreign judicial system, except for purposes of obtaining enforcement of the arbitral award. Since the Soviet Union is a signatory to the Convention on the Recognition and Enforcement of Foreign Arbitral Awards, enforcement of any arbitral award should not require special legal action (Jones, Day, Reavis, & Pogue, 1987; Cherin & Combs, 1983).

THE STRATEGIC CONTEXT

Trade between East and West involves the sale of products—goods and services—or the transfer of technology, or both. The difference between products and technology is not well defined or well understood. In general terms, products satisfy short-term economic goals but leave a country essentially dependent upon imports. In contrast, technology transfer confers new capabilities on the receiving nation. It can produce goods that meet both current and long-term needs, and it can develop a technology base which will support in turn the development of new technologies and products. Once a technology is transferred, it is difficult to control either the flow of the products or the future applications of the technology. The decision is often irreversible (Bucy, 1981). In U.S.-U.S.S.R. joint ventures especially, the export of 'high-growth technologies' to Soviet enterprises has potentially far-reaching economic, military, and political implications.

Economic Considerations

The U.S. Export Administration Act and its supporting regulations serve as the primary control over the sale of goods and the transfer of technology between the U.S. and the Soviet Union. Many U.S. firms argue that export controls are a serious barrier to expansion of East-West trade. Sales of products and technology to the East are lost, it is claimed, to firms from Western Europe, which are significantly less encumbered by governmental export controls.

Disagreeing with this claim, the U.S. Congressional Office of Technology Assessment (1979) cites the shortage of hard, freely convertible currency in the East as the primary factor limiting the growth of trade between East and West. Because of the shortage of currency, Western firms doing business with the East are required to provide financing for the transaction, or to accept payment in the form of products manufactured with the technology that they provided to begin with (the so-called 'buy-back' provisions). When firms decide to make credits or financing available, credit risk is a significant concern: the debt of some Eastern European nations has reached staggering proportions, and there is always the possibility of default (Bucy, 1981). On the other hand, when firms have chosen to accept payment in the form of manufactured products, these 'buy-backs' have led to an unprofitable penetration of the Western firm's established markets. For example, the sale of turnkey ammonia plants to the Soviet Union resulted in the importation of large quantities of chemicals into the U.S. This increase in supply caused serious market disruptions and plant closures in the U.S.

Military Considerations

The most effective mechanisms for transferring technology are those in which there is intense and continuing communication between the transmitter and the receiver (Bucy, 1981). By this criterion alone, joint ventures and other industrial cooperative arrangements qualify as very effective technology transfer mechanisms, hence their new-found popularity in the Soviet Union. Critics in the West, however, charge (and most observers agree) that the transfer of Western expertise over the last fifteen years has contributed positively and significantly to Soviet military capabilities, particularly in aerospace, naval, microelectronic, and computer technologies (Overman, 1985). Because the U.S.S.R. is commonly thought to surpass the U.S. in military spending and in sheer manpower, it is a widely accepted mandate in the West that the U.S. must at least maintain 'technological superiority' (Bucy, 1981). Through a system of export control laws and regulations, the U.S. attempts to control technologies that might directly contribute to the effectiveness of the adversary's weapon systems. The difficulty arises in deciding which technologies have military significance.

Many commercial technologies have the potential for dual use. Moreover, commercial applications of technology now commonly precede military applications and become widely available, so that governmental restrictions on military applications would come too late. For instance, large-scale integrated circuits appeared first in watches and calculators, and were only incorporated into military weapon systems some seven to ten years later (Bucy, 1981). In view of the uncertainty that is inherent, many factors have to be considered in determining whether or not an item belongs on the export control list. These include: the essential features of the item, its civilian uses, its military uses, its end-use pattern in the U.S., and its technological state of development.

A compounding problem is the availability of much comparable technology abroad and the inability of the U.S. to obtain adequate cooperation from its allies to control these critical technologies. One mechanism for such cooperation, the Coordinating Committee for Multilateral Export Controls (COCOM) is an informal organization through which the U.S. and its allies attempt to coordinate controls over export of strategic materials and technologies to the communist world. But while COCOM recognizes the need to withhold items of direct military relevance from the nations of the Warsaw Pact, it assigns a narrow role to export controls in this matter. There is little—if any—debate within COCOM similar to that in the U.S. over the military and strategic implications of technology transfer to the East (U.S. Congressional Office of Technology Assessment, 1979). Consequently, foreign availability with little or no restriction usually prevents the U.S. from imposing export controls unless there is a clear and present danger to the national security (Gordon, 1987).

Political Considerations

Some Western observers perceive in the Soviet Union an acute need for the importation of Western technology and capital equipment. This perception is often cited to support the use by the West of trade as an instrument to obtain political concessions from the East in domestic and foreign policy areas. Recent attempts of this character have been made to curb the perceived violation of human rights and the alleged condoning of terrorist activities. However, this strategy of linking trade to political concessions has not proven to be effective for the U.S. The Soviet Union aims to achieve self-sufficiency in all areas. Presumably, the holding of technology as hostage in exchange for political concessions only reinforces the Soviet desire to achieve this self-sufficiency. Moreover, political controls imposed on the Soviet Union are often erratic, changing with each U.S. presidential administration. Furthermore, the political desires of the U.S. are not always congruent with those of its Western allies. Often, restrictions imposed by the U.S. for political purposes are seen to weaken alliances with allies (Overman, 1985; Bucy, 1981).

Current U.S. Policy

In summary, U.S. export control laws and regulations impose substantial restrictions on the kinds of goods and the types of technologies that U.S. firms can transfer to the Soviet Union. Current stated U.S. policy has the dual objective of (i) encouraging exports and technology transfer to the East and (ii) protecting vital U.S. national security interests. The transfer of certain 'critical' technologies requires U.S. firms to obtain export licenses which have to be validated on a case-by-case basis. These validations may be denied in the interest of national security or foreign policy objectives (Overman, 1985; U.S. Congressional Office of Technology Assessment, 1979). Significantly, the President has the authority, where there is a serious and direct threat to national security, to void offending contracts, even if they were entered into by U.S. firms at a time when their terms were legal and proper. Such uncertainties and restrictions place important constraints on the range of collaborative activities in which U.S. firms can engage Soviet enterprises.

OBJECTIVES OF THE PARTIES

Assuming for this discussion that only two parties—a U.S. firm and a Soviet enterprise—are involved in a hypothetical joint venture, the following general observations hold with regard to the interests and objectives of the principals.

A cynical school of thought holds that the Soviet Union has historically turned to the West whenever its military requirements overburden its industrial capacity (Bucy, 1981). Once the desired level of internal development is achieved, the cynics claim, trade is broken off summarily. Be that as it may, the objectives of the Soviet party in forming a joint venture may include some or all of the following:

1. To modernize the industrial base by obtaining access to advanced Western technology and management skills.
2. To improve the quality of existing goods and services provided by enterprises to consumers in the Soviet Union.
3. To establish domestic production capabilities so that imports are unnecessary, foreign currency reserves conserved, and industrial independence achieved. This objective is commonly known as import substitution.
4. To establish a new export-oriented source or capability, thus obtaining access to foreign currency.
5. To secure access to Western markets that would otherwise be closed or restricted to Soviet participation.
6. To obtain access to advanced technology for military purposes.

A U.S firm, on the other hand, might generally enter into joint ventures and other cooperative arrangements, both in the capitalist and communist worlds, for four principal reasons (Heimann, 1987; Morris & Hergert, 1987):

1. To access markets where independent entry is difficult because of legal restrictions or traditional relationships and practices. In these cases, working with a local partner is, in effect, a condition to market access. One study reveals that 14% of all collaborative agreements between 1975 and 1986 were for entry into new markets.
2. To avail itself of useful and cost-effective resources. A partner may offer resources and capabilities that the Western firm does not possess, such as access to low-cost labor or special commodities.
3. To secure a competitive edge, through joint research and development efforts, through the exploitation of economies of scale and scope, and through the acquisition of local economic and political influence. One study discloses that 71% of collaborative arrangements during the 1975-1986 period were between competitors in the same market.
4. To minimize individual exposure. An investment may be so large or risky that a joint venture becomes a prudent way to share economic risk.

As may be apparent, the private economic interests of U.S. firms are not always compatible with the broader economic and foreign policy concerns of the U.S. government. Private firms may individually be more willing to help a local partner become a world competitor, balancing the potential loss of future market share and the release of sophisticated technology against the potential gain of immediate profits through collaboration (for a related discussion, see Hamel, Doz, & Pralahad, 1986).

MAJOR ISSUES FOR NEGOTIATION

The recent enactment of a Soviet joint venture law is producing a growing body of literature describing the multitude of issues that parties must consider in establishing a joint venture in the Soviet Union. A brief review of the more significant matters raised in this literature will provide useful insight into the many negotiating issues and complexities that attend the formulation of joint ventures in the controlled economy of the Soviet Union.

Ownership, Management, and Control

In the traditional Soviet framework, the state owns the means of production. The concept of operative management, however, enables the state to entrust these production resources to state enterprises. The enterprises have a right and a duty to manage these resources in accordance with terms and conditions that are acceptable to the state. While Western partners in Soviet joint ventures cannot own production resources outright, they are protected by the new joint venture law against expropriation by the state. In addition, they can secure through negotiated agreements essentially the same rights that would normally accrue to ownership (Pedersen, 1975).

Foreign firms are permitted a maximum of 49% equity participation in a Soviet joint enterprise, with the Soviets retaining majority control. One commentator notes that majority control by the Soviets may be required more for ideological reasons than to actually control the venture (Jones, Day, Reavis, & Pogue, 1987). In any case, the ultimate decision-making authority of a Soviet joint venture is its Administrative Board. Soviet law allows each partner equal representation on the board despite differences in equity investment percentages. The law requires unanimous consent on some stipulated matters and permits the parties to require unanimous consent in all other matters (Ross, 1987; Jones, Day, Reavis, & Pogue, 1987). Most Eastern bloc countries expressly permit foreign participation in the management of the joint venture. While the Soviet law is silent on such a provision, it is expected that the foreign participant will be allowed to play an active role in the management of the company (see Carpenter & Smith, 1987; Ross, 1987; Jones, Day, Reavis, & Pogue, 1987). The chairman of the board and the chief executive officer (the "director-general") of the venture must be Soviet nationals, but the parties are free to leave the foreign partner to control individual functional areas such as production, quality control, technology, and exports. The parties can require that all decisions of the board should be unanimous, thus providing both partners with important veto rights and limiting the discretionary authority of the chairman and director-general (Ross, 1987). Incidentally, the Soviet Communist Party can also figure in the decision-making process of the venture. Although the local party organization does not appear on the organizational charts of Soviet enterprises, it can exercise enormous control over management decisions because practically all members of management are party members subject to party discipline (Jones, Day, Reavis, & Pogue, 1987).

A related management issue involves the Soviet tendency towards industrial and economic secrecy. To ensure the smooth functioning of the joint venture, Western firms would argue that information about many aspects of the Soviet system must be revealed to them, and not reserved for premier authorities of state enterprises as they previously have been (Pedersen, 1975). While the recent call for openness—*glasnost*—receives significant media attention, its implementation and effectiveness have yet to be evaluated.

Domestic Operating Procedures

Joint ventures operating in the Soviet Union are free to decide upon their own economic activities and are not subject to state planning targets (Carpenter & Smith, 1987) nor entitled to guaranteed, *i.e.*, subsidized, sales (Jones, Day, Reavis, & Pogue, 1987). In practice, these exemptions are limited by (i) the dependence of joint ventures for their supplies and services on state government organizations that are subject to these plans; and (ii) the need for joint ventures to sell their products to these same organizations. In order to ensure quality and adequacy of supplies and services, as well as to establish the price of these resources, it is important that a joint venture secure binding commitments and explicit priorities from the respective Soviet organizations. While joint ventures are permitted to establish their own domestic selling prices, all domestic sales must be made through foreign trade organizations and must be paid in rubles at "contract prices with account of world market prices" (Jones, Day, Reavis, & Pogue, 1987). Thus, a state that controls both the joint venture's domestic supplies and its domestic sales is obviously in a position to control the venture's prospects for success in the Soviet market.

The Soviet joint venture law also requires the application of Soviet labor laws, and stipulates that the management of each joint venture must conclude collective agreements with trade union organizations (Carpenter & Smith, 1987). The application of these labor laws limits the flexibility of the joint venture in hiring, compensation, transfer, discipline, dismissal, and labor dispute matters. Soviet law also applies to foreign employees, except in such matters as compensation and other benefits, which are governed by negotiation and individual employee contract (Jones, Day, Reavis, & Pogue, 1987).

Technological Considerations

The Soviet objective of seeking arrangements for technology transfer is obviously hampered by Western export policy. On the other hand, some relaxation in export controls is occurring. The U.S. recently ended a nine-year ban on the sale of oil and gas equipment to the U.S.S.R., and the list of unrestricted products is expected to be revised—and lengthened—again soon (Ross, 1987).

The laws of the Soviet Union offer patent protection for a period of fifteen years, as defined in the Paris Convention on the Protection of Industrial Property. In the case of East-West joint ventures, local patent law may be supplemented with an agreement restricting the joint venture from revealing its technology to third parties. Disturbing to foreign partners, the Soviet joint venture law allows the Council of Ministers to order compulsory licensing of patents and to fix the compensation for such licenses, although this authority has never been invoked. The partner providing the technology in a joint venture would require adequate compensation in the event of any such compulsory license. In addition, the partners should agree beforehand not to infringe the technology contributions of each other, or to expropriate the research and development results of the joint venture (Carpenter & Smith, 1987; Pedersen, 1975).

Environmental Considerations

Environmental problems are commonly ascribed (in the West, at least) to the divergence between individual incentives and group incentives. The usual theory suggests that centrally planned economies avoid such problems, because centralized decision-making allows collective decisions to be made at the outset. To use a metaphor from negotiation, one might say that the interests of the

individual are subordinated to the interests of the whole, or that distributive bargaining is pre-empted by an implicit integrative bargaining process. The facts, however, do not bear out the theory.

Empirical studies have shown that centralized planning creates different, but no less potent, divergences between individual interests and group interests. For example, as of 1970, fully 65% of all factories in Russia, the largest Soviet republic, discharged their waste into local rivers, lakes and aquifers, making no attempt to reduce the damage to the environment (Goldman, 1972). Central planning apparently emphasized *collective* economic growth over *collective* environmental well-being (Powell, 1971).

Today, matters have improved, but only haphazardly. While enterprises in the Soviet Union operate under a complex system of environmental laws on the national, republic, and local level, these laws are overlapping and unbalanced, and lack a clear and unifying national policy (Tietenberg, 1984). On the other hand, the role of the public in the environmental decision making process is increasing. Public opinion was responsible, for example, for the recent cancellation of a plan to divert part of the flow of several northern European and Siberian rivers (Messina, 1988). One could conclude that environmental effects are nowadays as carefully evaluated in the Soviet Union as they are elsewhere, and that even foreign partners in a Soviet joint venture would be obliged to consider them as well.

Foreign Currency Requirements

The Soviet law requires new joint ventures to raise sufficient foreign currency through exports to cover their foreign exchange requirements. The Soviet *ruble* is not freely convertible into other foreign currencies. Unless the joint venture has adequate reserves of foreign currency, it may be precluded, by law, from paying salaries to foreign personnel, importing critical machinery and equipment, and repatriating profits to the foreign partner. In particular, repatriation of profits in the form of foreign currency is limited to the amount of such currency that the joint venture has earned from export sales outside the Soviet Union (Carpenter & Smith, 1987).

Foreign currency credits and loans may be available from Western financial institutions and, in more limited amounts, from Soviet banks. Because these loans must be repaid, a venture is not likely to be granted a loan unless it can demonstrate adequate capacity for earning foreign exchange, or has sufficient collateral to secure the loan.

An added complexity is the official exchange rate of U.S.$1.60 to the ruble. The actual exchange rate in the West is about U.S.$0.20. This difference may cause significant valuation problems. Soviet laws provide some opportunity for arbitrage against these valuation problems by allowing the parties to designate the currency to be used for purposes of valuing capital contributions and settling accounts with domestic organizations (Jones, Day, Reavis, & Pogue, 1987).

Tax Considerations

Soviet law provides for a two-tiered tax structure: joint venture profits are taxed at 30% of net profits while any profit repatriated to a foreign partner is taxed at an additional 20%. Taxes are applied to profits after reduction for mandatory contributions to a reserve fund, which must equal at least 10% of profits until the fund reaches 25% of total capitalization (Ross, 1987). Soviet law also allows a two-year "tax holiday"—an exemption from taxation to secure the prospects of a fledgling venture. It also provides considerable flexibility in taking depreciation-related tax deductions, permitting the parties to establish their own depreciation schedules (Carpenter & Smith, 1987). Moreover, the Soviet Ministry of Finance has discretionary power to reduce or eliminate tax liability at any time if a venture is of special value to the Soviet interest (Jones, Day, Reavis, & Pogue, 1987). Despite all these favorable conditions, however, a foreign partner in a Soviet joint venture would be

well-advised to place the burden of compliance with future changes in tax law on the Soviet partner, by stipulating that the effective taxation of joint venture profits (or the amount of those taxes effectively paid by the foreign partner) shall in no circumstances exceed an agreed-upon maximum tax rate.

Sale and Dissolution Considerations

As noted earlier, the new Soviet joint venture law precludes acts of expropriation by the state. Equity in the joint venture can, however, be transferred in other ways. For example, participants can transfer shares to third parties only if (1) the other partners consent, (2) the Soviet partner is permitted a right of first refusal, and (3) the transfer is authorized by the State Foreign Economic Committee. These restraints give the Soviet partner an effective veto power over the transfer of the foreign partner's interest in the joint venture. A foreign partner may need to impose guidelines that limit the exercise of this veto power (Jones, Day, Reavis, & Pogue, 1987).

According to the new law, a joint venture may be liquidated by agreement of the parties or through action of the Soviet Council of Ministers if the activities of the joint venture are "inconsistent with the objectives envisioned." After dissolution, the foreign partner is entitled to receive its share of the residual value of the venture's assets in cash or in kind. A joint venture agreement should provide criteria for determining the valuation of the remaining assets, and give the foreign partner the option to take cash or in-kind assets. The remittance of cash in the form of foreign currency is limited to the extent that the venture has earned such currency. If foreign currency is not available, the foreign partner may be required by law to take its share in the form of goods (Carpenter & Smith, 1987; Jones, Day, Reavis, & Pogue, 1987).

Other concerns pertaining to dissolution include the right to use of the technology after termination and the future handling of exports of joint venture products from the Soviet Union. It may be prudent for the partners to seek to protect the venture against any future changes in Soviet laws. If such 'grandfather clause' protection is not possible, the Western partner should have the right to require termination of the venture in the event that the parties cannot agree on appropriate revisions to their charter agreement when changes occur in the Soviet laws.

COMPUTER MODELS AS AIDS IN JOINT VENTURE NEGOTIATION

The recent change in Soviet laws permitting cooperative joint ventures with Western firms is a testament to the perceived effectiveness of private negotiation in satisfying the needs and wants of different peoples. Negotiation of an East-West joint venture is, however, very complex. The parties have radically different political, social, and economic orientations. The venture often involves a panoply of technical, operational, and financial issues and interests. These circumstances provide an excellent opportunity to illustrate how negotiation theory and computer modeling techniques may be integrated to support a complex joint venture negotiation:

> International joint ventures involve complex negotiations between the principals over both financial and technological matters. In many cases, potential external effects of the joint venture also require that the principals communicate with and seek the approval of other parties, be they governmental agencies, sub-contractors, or even the citizenry at large. Because joint venture negotiations encompass a wide variety of substantive issues, the potential for the use of models is correspondingly broad (Nyhart & Samarasan, 1988).

The use of computer models is not alien to international investment. One example, COMFAR (Computer Model for Feasibility Analysis and Reporting), was developed by the United Nations Industrial Development Organization (UNIDO) in 1983, and is now in use in over eighty countries (United Nations Industrial Development Organization, 1987). The model communicates in many languages, including

Russian, French, German, Spanish, and English. It performs an economic and financial feasibility analysis of investment projects (including joint ventures), requiring inputs on such critical variables as level of capital investment, type of debt-financing, expected sales and costs, depreciation policies and tax rates. Such a model greatly enhances the ability of planners to make considered decisions (Klykov, 1988).

Other modeling tools are also potentially useful in joint venture negotiations. Applying the concepts of *system dynamics*, models have been developed which provide negotiators with greater insights into the effects that changes in one variable may have on the other variables in a dynamic system (Samarasan, 1988). These causal and feedback influences, made apparent by manipulating the model through what-if analysis, are not intuitively obvious without the application of the model. Still other modeling tools use the methods of *decision analysis* to help negotiators cope with uncertainty as they make decisions about substance and strategy (Samarasan, 1988). Both of these modeling methodologies—system dynamics and decision analysis—are discussed briefly in the paragraphs that follow. While other modeling methods, such as utility analysis, Pareto-optimization, and process simulation, are all useful, they are beyond the scope of this paper (the curious reader is referred, instead, to Nyhart & Samarasan, 1989; Messina, 1988; Goeltner, 1988; Goeltner, 1987; Samarasan, 1986).

System Dynamics Simulation Models

Models are representations of reality, and can be classified in many ways: computer *vs.* non-computer, static *vs.* dynamic, mathematical *vs.* physical, optimizing *vs.* simulating, probabilistic *vs.* deterministic, and so on. Because there are so many alternate ways of viewing the universe of possible models, no conceivable model classification scheme will ever be free from redundancy. Many, many modeling methodologies exist, and each has its own strengths and weaknesses.

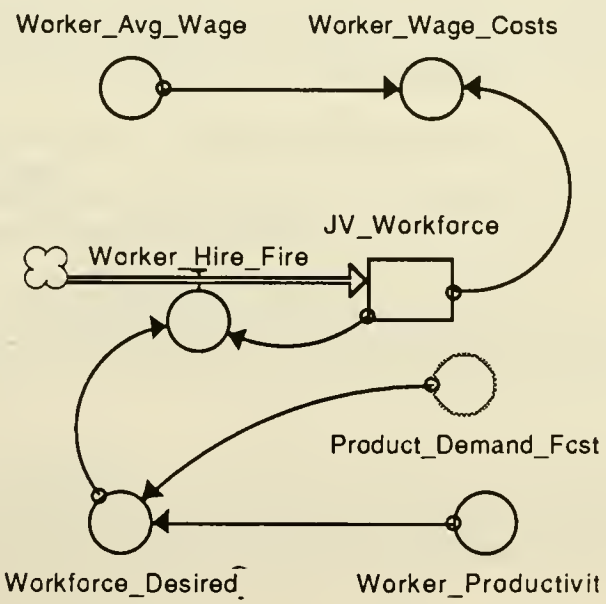

Figure 1: A Simple Workforce Simulation Model

Since the effective use of computer models in negotiation turns on precisely the question of how effectively models aid in the understanding and communicating processes of the group, a necessary condition is that models designed for use in negotiation be as clear and as conducive to use as possible. Consequently, the choice of methodology is equivalent to answering the question: how can a negotiator be provided with a modeling tool that is flexible and easy to use (*i.e.*, a user-friendly tool)? If models are to be jointly built and used effectively in negotiation, one might expect that the modeling methodology ought at least to be accessible to non-experts. System dynamics offers one such methodology. Properly facilitated, it provides a way of constructing and analyzing models that is at once flexible and intuitive (Senge, 1985; Kreutzer, 1985; Sterman, 1985). In its most recent software incarnations, the system dynamic methodology uses graphical elements to represent systems whose dynamic behavior patterns are based on ordinary differential equations (Richmond, Peterson, & Vescuso, 1987).

Figure 1, for example, presents a typical small system dynamic simulation model that might be of interest to negotiators discussing the management of a proposed joint venture. The primary variable of interest in this model is JV_Workforce, or the workforce to be employed by the joint venture (represented by the rectangular *stock* symbol in the figure). The size of this workforce depends, in this case by definition, on Worker_Hire_Fire, the rate at which workers are hired or fired by the joint venture. This rate in turn depends on the discrepancy between JV_Workforce, the existing workforce, and Workforce_Desired, the desired workforce. The various arrowhead arcs depict these relationships. More detail is included in the figure: it shows that the desired workforce size is a function of Worker_Productivit, or average worker productivity and Product_Demand_Fcst, the forecast demand for the product of the joint venture; finally, the figure also indicates that the labor costs incurred by the joint venture depend on JV_Workforce, or the size of the workforce at any given time, and Worker_Wage_Costs, or the average wage paid out by the joint venture. With a little practice, models like the one shown in the figure even seem to explain themselves.

This is not to say that here is no rigor in system dynamics modeling: the rigor is there, but it can often be bypassed without sacrificing qualitative accuracy. In the above explanation, for example, it was assumed that the negotiator was interested only in obtaining a *qualitative* understanding of the workings of the model. But while a graphical representation is useful in qualitative explanation, any numerical simulation done on the computer must rely on quantitative relationships. The following equations describe, in precise mathematical form, the same relationships indicated on the diagram:

JV_Workforce = JV_Workforce + dt*(Worker_Hire_Fire)
INIT(JV_Workforce) = 2000
This variable tracks the number of workers employed by the joint venture. Each month, workers are hired or laid off, depending on the needs of the venture.

Product_Demand_Fcst = FORCST(Product_Orders, 12, 1, 0)
Demand for the product of the joint venture (in unit sales per month) is forecast in the model using actual order data, a 12-month averaging period, a 1-month forecasting horizon, and an initial trend (or rate of increase in demand) of 0.

Worker_Avg_Wage = 0.024/12
This variable specifies the wage paid to each worker (in $ million per month): "0.024/12" corresponds to $2000 per month, an annual wage of $24000. For the purposes of the example, it is safe to assume that this "wage" also covers all benefits and other legally mandated transfers. The unusually unit for wage is used because it facilitates calculation elsewhere in the model.

Worker_Hire_Fire = (Workforce_Desired - JV_Workforce)/5
The number of workers to be added (or removed) each month to (or from) the workforce can be determined by management using the formula above. For example, when the desired workforce (which

is a function of product demand) exceeds the number of workers currently employed by some number *N*, management might lay off those *N* workers over a period of some months (5, in the equation above). By not firing all *N* workers at once, management reduces the shock to the system, and also retains the practical option of reversing its decision should the unexpected occur.

Worker_Productivity = 0.006
The productivity of the typical joint venture worker is specified, say, in terms of the number of units of product that one worker could produce each month.

Worker_Wage_Costs = JV_Workforce*Worker_Avg_Wage
Total wage costs are measured in $ million per month.

Workforce_Desired = Product_Demand_Fcst/Worker_Productivity
At any given time, the desired workforce (number of workers) depends on how much "work" there is to do, and how much "force" (or productivity) each worker exerts.

As the annotations above show, the equations that make up a model, although precise mathematically, embody a number of assumptions that may or may not be shared by all parties in the negotiation. In building their model, therefore, negotiators would be forced to confront these issues and ambiguities, which would normally go unnoticed and prolong or stall their negotiations. By making important assumptions explicit, the building and analysis of simulation models helps negotiators to communicate their interests and concerns before taking a stand on the issues (Straus, 1986).

There are three levels at which such simulation models may be modified. On the most general level, negotiators may wish to remove or include entire components. Such a modification could be quite extensive, because it would *challenge implicit (unspoken) assumptions* made in the model. The second level of modification does not question basic assumptions about what components to include in or exclude from the model. Instead, modelers would *build new relationships* between parts of the model that already exist. To be sure, new variables would have to be defined, but each of these would relate to one of the existing components. The lowest level on which modification is possible is at the level of individual numbers. Many of the variables in the model are not pre-determined, either because of underlying uncertainties in the physical system, or because they relate to issues within the negotiation agenda. In both of these cases, the negotiators can *perform a sensitivity analysis* to discover the effect of changes in the numbers.

Clearly, before using a particular simulation model to argue for or against a particular proposal, negotiators have to face several questions. What components ought to be included in the model? Are there good reasons to include or exclude particular concepts? And if components are to be linked, where are the necessary knowledge and data to come from? Negotiators should try to achieve agreement on a set of *stable assumptions* on all three of these levels before they bury themselves in data, or controversy, or both.

To say that simulation models can be modified on three levels is to say that they are very flexible. Because of this extensive flexibility (or "fudgeability") in the model, the temptation is to fine-tune it until "perfect" results are obtained. The user is advised to resist this temptation vigorously. The simulation model is a tool, and not an end in itself. There are two extremes to be avoided. On the one hand, if negotiators throw "perfect" models back and forth at each other, the gap between them only widens. On the other hand, if negotiators are jointly obsessed with the crafting of a "perfect" model, they will blindly model away all real physical and political constraints. The resulting model will be uselessly utopian.

Because it is very easy to get caught up in the technology of computer modeling, negotiators should periodically ask themselves why anyone would want to use computer simulation models in negotiation management in the first place. In this context, the joint development and use of a simulation model by the parties holds at least four important advantages: (1) it allows the parties to focus on the

issues and inter-relationships rather than on their positions; (2) it exposes unrealistic private assumptions; (3) it fosters a good working relationship among the negotiators; and (4) by asking "What if ... ?" questions, by performing comprehensive sensitivity analyses, and by conjuring up relevant scenarios and pursuing them through simulation, negotiators can enhance considerably the level of understanding with which they approach substantive questions.

One of the more frequently cited and contentious issues arising from the use of such models in negotiations is that of model validity. Often, parties spend as much time and effort debating the validity of other parties' models as they do actually trying to resolve the conflict. This exercise has been called, and not entirely humorously, "the battle of the printout" (Straus & Bazerman, 1985), in which computers and computer models are used to confuse, and even to bully one's negotiating counterparts. Since such a battle only adds to the cost of negotiation, negotiators should understand how they can avoid it without having to automatically accept the validity of all models brought to the negotiating table.

A key concept in the validation of simulation models is that of *reference behavior*. The essence of this important concept is quite easily described. A simulation model is usually built to study a problem. One does not, properly speaking, build a vaguely generalized "model of a system." The simulation model is more appropriately a tool focused on those aspects of a system that are problematic. Modelers would like to use the tool to test various plans of action and thus find the one plan that best suits their purposes. In order to do this, the model that is used must be 'accurate': it must be as faithful as possible to reality (*i.e.*, to the reference mode or data) in its representation of the behavior of those parts of the system that contribute to the modeler's original problem. How faithful, or how accurate, a simulation model needs to be is not a matter of science. It is a judgment to be made by the modeler. Depending on the circumstances and the amount of data available, more or less effort may be appropriate (Sterman, 1985).

What is *not* a matter of judgment, however, is the *minimum* standard for model validity, which, almost by definition, is the ability of the simulation model to reproduce the problem, *i.e.*, the relevant behavior of the system, as originally perceived and as documented by the data. Before making any decisions based on a simulation model, negotiators should run it in its reference mode to confirm that it at least reproduces the relevant behavior of the real system. As long as the modeling methodology emphasises causal relationships (as system dynamics does) and not statistical correlation, the ability of the model to reproduce actual behavior is a reasonably good indicator of its validity (Randers, 1980). The data that make up the reference mode need not be all quantitative. In many cases, only a qualitative sense of the relevant details is available. Fortunately, system dynamics allows the incorporation of such subjectively defined data.

Not to put too fine a point on it, a simulation model is never absolutely valid. It is only valid in particular circumstances, and by its nature can only withstand a certain amount of scrutiny. For it to apply beyond that point, a given model may have to be revised or even completely redesigned. Yet, this fact of life is not a limitation of the modeling methodology. Indeed, if simulation models were to be mirror images of reality, they would necessarily be as complicated (and as unfathomable). Although experts would argue that more sophisticated tests of model validity are available, the reference mode test (as described here) is at least intuitively appealing and accessible to non-experts. By assembling and using the data to set up reference behaviors against which developing simulation models can be compared, negotiators are at least sure that their simulation models conform to a minimal standard of validity. In the final analysis, a model that does not conform to this minimal standard is seldom acceptable.

Decision-Analytic Models

A difficult issue that often arises in a negotiation is the degree of certainty with which various categories of information are held by the different parties (Raiffa, 1982; Raker, 1987). Often, there is incomplete information about many substantive variables that are deterministic in nature. In other cases, the variables themselves are only probabilistically defined. And when the eventual outcome of a particular gain or concession is not immediately obvious, the management of process risk and uncertainty becomes an important part of the negotiator's role as well. Decision analysis provides a systematic method with which negotiators can make calculations and judgments regarding uncertainty. Negotiation, after all, is a complicated sequence of decisions made under uncertainty. Since decision (and decision tree) analysis is well-known, only a brief explanation is presented here in the context of negotiation management.

A decision tree (see Figure 2) is a graphical representation of (1) the various options open to decision-makers, and (2) the various outcomes that might befall them by chance. Implicitly, a tree also includes an objective function which determines the payoff associated with each set of possible outcomes. By taking into account the expected rewards and costs associated with each option, and the multiple probabilities or probability distributions associated with each chance (or random) variable, the method allows a negotiator to calculate the expected value of each possible combination of options and outcomes. Several modeling tools are available that implement the methods of decision analysis on computers (see, for example, Raker & Urgel, 1988; Steeb & Johnston, 1981).

Generally speaking, a decision tree proceeds from left to right, representing the issues under discussion in logical or chronological order (Nyhart & Samarasan, 1989). Nodes in the tree can be decision nodes, chance nodes, or terminal nodes. From decision nodes emanate specific options that are available to the negotiators. From chance nodes, branches emerge that represent specific alternative states of nature not within the control of the negotiators. Each branch is assigned a probability—a number from 0 to 1 that represents how likely it is that the branch will occur. Each terminal node in the tree corresponds to the combination of all decisions and events encountered along the path from the root to that node. In other words, each path from the root node to a terminal node represents a different *scenario*. Once the tree structure is defined, the software uses the decision-analytic method to calculate the optimal set of decisions through backward induction.

The decision tree model shown in Figure 2 might well represent the choices and possibilities that have to be faced by a U.S. negotiating team considering a U.S.-U.S.S.R. joint venture. In the diagram, starting on the far left, the team has to decide whether or not to negotiate under current circumstances. This is a conscious decision, and is represented on the tree as a square node. So long as the U.S. team does indeed choose to pursue the joint venture (*i.e.*, to pursue the upper branch at this first node), it has to decide whether it will agree to a joint venture that manufactures two products (A & B) in the Soviet Union, or only one product (A only). The model suggests that the first alternative is problematic, in that it might invoke the resentment of the U.S. Department of Defense, who could very easily "cause trouble" for the venture: presumably, the exportation of product B is highly sensitive and restricted. This possibility is not a *decision* that the negotiators can make; rather, it is a chance outcome as far as they are concerned, and is represented on the tree as a circular node. But in either case—manufacturing either one or both products—the joint venture would be further susceptible to the vagaries of ordinary commerce: both costs and sales could be either high or low. Each combination of outcomes would have a payoff, or expected profit, associated with it.

Thus, the question of whether to negotiate a joint venture is represented in the model as being affected by three uncertainties. Once these uncertainties are defined, expected payoffs can be calculated for each scenario—the triangular nodes at the far right of the diagram. In this way, the value of the negotiating option can be estimated, even though only probabilistic information (and not certainty) is available regarding many of its variables.

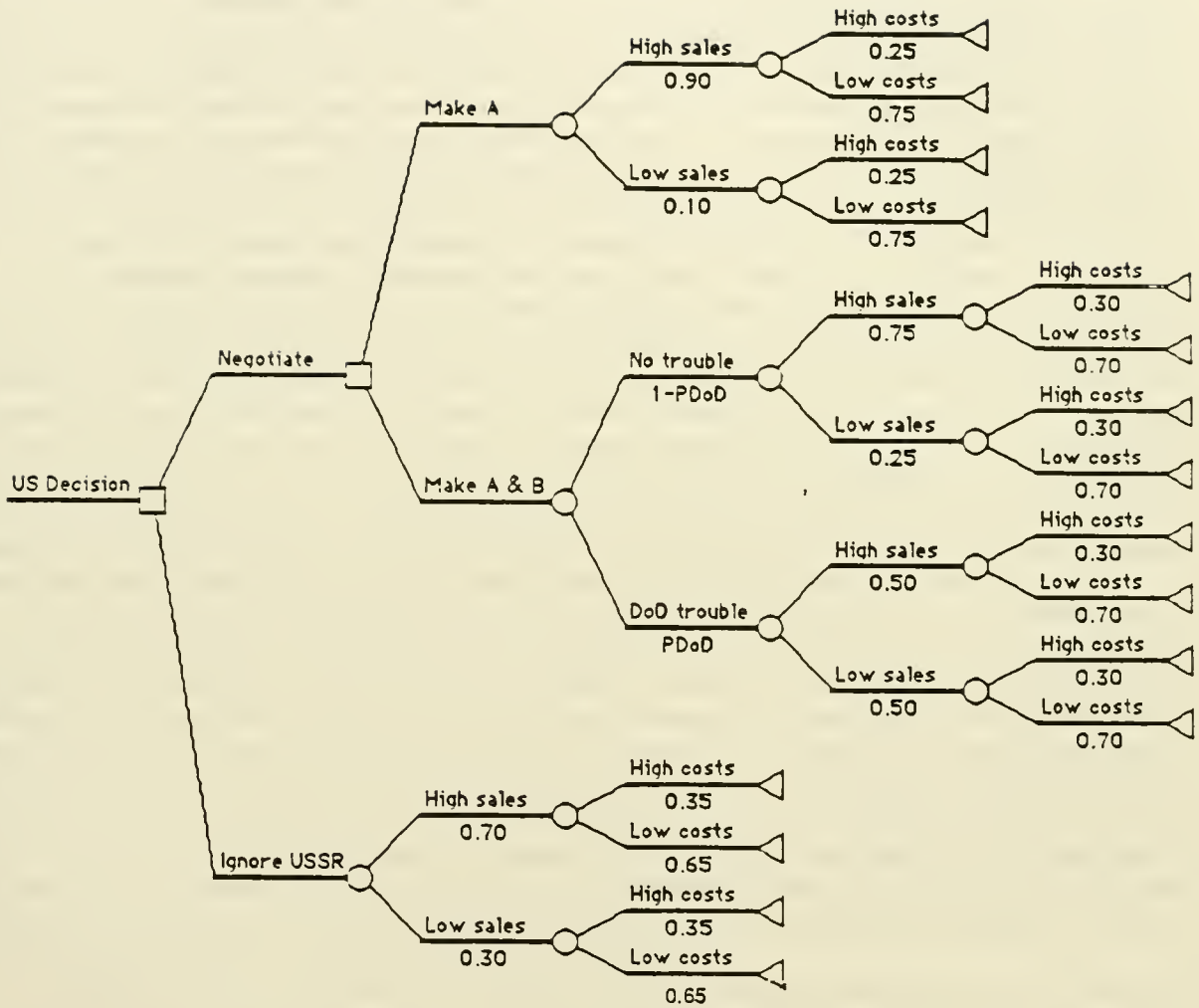

Figure 2: A Decision Tree for a Negotiator Considering a Joint Venture

Similarly, if the U.S. negotiators decide not to negotiate the establishment of a joint venture under the circumstances, they can always proceed in their current business plans (the lower branch emanating from the first decision node on the left in Figure 2). These plans, too, involve some risks: costs and sales of their currently manufactured products could be either high or low. Just as before, the expected value of the "Do Not Negotiate" option can be calculated. By comparing the values of the available options—by comparing, that is, the likely outcome of negotiation to the best alternative to a negotiated agreement—the model helps negotiators make decisions that are, arguably, more likely to be optimal than unaided decisions.

Optimality in decision analysis is simply the best possible expected value of the objective function. To put it differently, decision analysis prescribes optimal choices on the assumption that the negotiator or decision-maker is a rational maximizer of personal utility (for a more complete exposition of the axioms of decision analysis, see Drake & Keeney, 1978). Further, the method, at least in its simple incarnation described here, most often measures utility or satisfaction in an objective function that is denominated in monetary terms. Therefore, when a particular choice or set of choices is recommended as being optimal, the usual meaning is that no other choice provides as high an expectation of profit, or as low an expectation of loss. But in addition to calculating expected value, the software provides information about standard deviations and probability distributions.

The standard deviation associated with an expected value of a particular set of chance outcomes is a measure of the risk or uncertainty implied by that expected value. It is calculated by comparing the (probable) expected value to the (possible) extreme values on either side of it. Two sets of outcomes (or two chance nodes in the tree) may be found to provide the same expected value, and therefore be judged equivalent by the simple "expected monetary value" decision analytic method described above. But if the standard deviation of one is greater than that of the other, it is likely that the two sets of outcomes are not equivalent in the eyes of a human decision-maker. In fact, a risk-averse decision-maker might even be willing to accept a lower expected value if it involved less uncertainty. Therefore, by paying attention to standard deviation as well as expected value, a negotiator can make a more informed decision than is possible through the simple maximization of expected value.

One way in which a decision-maker can visualize the full implications of each chance node is to look at the probability distribution associated with the sub-tree rooted at that node. This distribution is a graphic representation of all possible outcomes at the given chance node. Strictly speaking, there are as many possible outcomes at a node as there are scenarios that include the node. In other words, each scenario in a sub-tree is a distinct outcome. For the purposes of assessing probability distribution, however, outcomes are only distinguished from each other if they result in different payoffs (or values of the objective function). For each distinct payoff, the distribution graph shows how likely it would be. For example, if one very probable payoff was large and many very unlikely payoffs were small, the distribution graph would show two probability clusters, the larger one at the location of the very probable payoff. By examining such a graph plotted for a chance node (or gamble) they are considering, negotiators can quickly visualize the risk involved.

Especially useful is the subsequent ability to analyze quickly the sensitivity of the optimal set of decisions to changes in assumptions about probability and expected value. Bargaining positions that are favorable under some assumptions may actually be irrelevant or even have a negative effect on the satisfaction of the negotiators and their constituents under other assumptions (Nyhart & Samarasan, 1989). Information, interests, or positions that might seem crucial at first may be found to be dominated by other information, interests, or positions. Decision tree analysis, therefore, can be used in negotiation management to scope the discussion and to focus it on the details that really matter. It can also provide a guide as to the practical value of information and certainty.

There are three levels at which decision trees may be modified. On the most general level, users may wish to remove or include entire components in a tree. The second level of modification does not question basic assumptions about what components to include in or exclude from the model. Instead,

modelers would change the relationships between parts of the model that already exist. Chance nodes in privately constructed trees, for example, might be jointly modeled as decision nodes if negotiators as a group found themselves in possession of more information and thus more able to *determine* an outcome. Such a change would not be difficult to implement, and would be a useful analytical tool. The lowest level on which modification is possible is at the level of individual numbers. Many of the variables in a decision tree are not pre-determined or handed down from on high. Subjective judgment and estimation are usually called for, because of underlying uncertainties either in the substantive facts or in the likely course of the negotiation process. Negotiators should aim to achieve agreement on a set of *stable assumptions* on all three of these levels, before plunging into an all-out bargaining session.

Decision trees are commonly used by individual parties to a negotiation for planning and preparation (see, for example, Raker, 1987). However, the *joint* use of the method by all parties involved in a negotiation is a valuable extension, after which private use is only a special case of its use by any single decision-maker (Nyhart & Samarasan, 1987). A decision tree that includes explicitly *all* the options available to one party in a negotiation will also include those options that are available to that one party in cooperation with the others. Negotiators can jointly develop decision models that comprehend those aspects of the negotiation agenda of interest to all parties. They can then merge these models with others representing their best alternatives to negotiation. In this way, negotiators can build consensus and still negotiate effectively.

To the extent that decision analysis is used to model substantive realities, many of the earlier comments regarding substantive simulation modeling apply as well to decision tree modeling. However, users should note that tree models (unlike system dynamics simulation models) are very much a static collection of numbers with little direct causal or dynamic implication, and less explanatory power. Since so much subjective judgment is included in decision tree models, the question of their validity is almost irrelevant. Their usefulness, when computerized, is that they make these subjective judgments explicit, automate what is a very unwieldy set of calculations, and then display the results in an intuitive and useful way. In addition, user-friendly software encourages a joint model-building effort, permitting the negotiating parties to model complex systems in a relatively short time period. Jointly building the model from the bottom up also contributes to trust of and acceptance in the model.

The benefits these models bring to the negotiation are many. Contextually, they permit negotiators to test their assumptions by asking "What if ... ?" questions. They expose extreme and unrealistic assumptions, and may permit the parties to gain consensual agreement on certain facts and shared interests and to identify other facts and interests where there are differences. They may provide "a common ground for proposals to be tested, differences to be dovetailed by ingenious analysis, and the disputants to be convinced to move to new-found accommodation" (Messina, 1988). And finally, they can also be use in monitoring the implementation of the agreement, to help parties resolve disputes arising from the negotiated relationship. Procedurally, models can build trust by sharing common tasks and providing an opportunity for the parties to improve their communications.

Effective Use of Computer Models in Negotiation

In the past, when computer models have been used in negotiation, their use has mostly (and perhaps unconsciously) been part of an adversarial strategy. And even under this restrictive condition, their results have often been ignored when they might have enhanced the process. The effective use of models in negotiation requires that participants give some thought to the relationship between their modeling and negotiating strategies. This relationship affects the willingness of the parties to use the software and to participate in effective group processes that include the use of that software. Three features of the relationship need to be emphasized (see Nyhart & Samarasan, 1987), and are outlined below.

The Model in the Middle

The joint use of the computer can help negotiators avoid the so-called "battle of the print-out." Having the model in the middle allows the parties to concentrate on joint problem-solving rather than on convoluted argument. Especially where objective information is required to deal with the scientific or technical complexity of the issues, a joint and open modeling effort may be to the advantage of all parties. In the case of a U.S.-U.S.S.R. joint venture, for example, the financial issues, especially, are fraught with uncertainty, and negotiators will quickly realize that they need to pool at least some of their information.

Collaborative Model-Building

If instead of using a model that comes pre-built, negotiators actually engage in joint model-building, the benefits of using models are compounded. Even if the technical experts and advisers on all sides understand all the issues completely, there is good reason for the negotiators themselves to jointly conceive, build, and experiment with simple models of reality so that they can better appreciate the strengths and weaknesses of other parties' positions and arguments. A joint model-building effort could precede actual bargaining, or it could run in parallel, the two concurrent processes informing each other.

Zooming and Bridging

In many issues, the substantive issues are not sufficiently understood and cannot simultaneously be modeled simply and accurately by any party individually. Several separate models might exist in each party's library that individually describe some of the issues. These models can and ought to be used together to form a comprehensive picture.

Zooming refers to a vertical movement, from a complex model to a simpler one (or *vice versa*), whereas bridging refers to a horizontal link between models dealing with different but related substantive problems. The ability to zoom is important because it allows modelers and model-users to specify their interests in convenient levels of detail. And the ability to bridge effectively between different substantive models is useful because it allows facilitators, negotiators, and their expert advisors to relate issues to each other, thus compensating for their narrow specializations. When building simple models of their own, or when trying to understand complicated models put forward by experts from the various teams, negotiators should always watch for those variables in the different models that link them.

USING MODELS IN THE CONTEXT OF SOVIET NEGOTIATION STRATEGY

The Soviets prepare extensively for negotiation and operate at a slow, deliberate pace. They believe, according to one assessment, that time works in their favor, inducing major concessions from Western firms that are thought to regard compromise and a prompt settlement as desirable. The strategies and tactics usually employed by the Soviets in many negotiations reflect a rather distributive orientation (Nite, 1985; U.S. Government National Foreign Assessment Center, 1978), and include:

1) a reluctance to provide or share information;
2) exaggerated demands to exchange later for concessions on more important quantities;
3) the use of completely redundant issues; and
4) a flair for log-rolling techniques, where the outcome of an issue important to the other side is linked to a concession on an issue more critical to the Soviets.

This distributive orientation, if unaddressed, may prove harmful to the negotiation of a long-term cooperative arrangement with a Western firm. But having made clear these "distributive-by-default"

aspects of Soviet negotiating strategy, we believe that the use of computer models can transform that strategy into one that is more conducive to the establishment and successful operation of a U.S.-U.S.S.R. joint venture. In the following paragraphs, we argue that U.S. parties negotiating joint ventures with Soviet agencies or organizations should take the initiative and introduce the collaborative use of computer models into their negotiations and joint deliberations.

Before negotiation begins, all parties involved should have *unilaterally* obtained important insights and understandings into the different interests of the parties, established measures of the subjective utilities of different combinations of interests and trade-offs, and evaluated the alternatives to a negotiated agreement for all sides. These analytical processes are essential elements of goal development, and will allow the identification of those interests held in common and separately by the parties. Interests held in common are numerous, as one would expect from the increasing popularity of East-West joint ventures, and include the following:

1) the ability for each party to achieve better results through entering a joint venture agreement than either can achieve alone;
2) the need to limit equity and debt financing to an amount the venture can reasonably support without creating significant risk of financial collapse;
3) the need to raise sufficient foreign exchange to cover foreign currency expenses; and
4) the need to permit the Western firm to use its modern management skills to manage the venture in the functional areas where it has advanced expertise, such as in technological development, production and finance.

There are also interests that may conflict, such as in the specific technology to be transferred to the venture and the royalties to be paid to the Western partner, in the values to be assigned to in-kind transfers of property, and in the overall control of the venture itself. By examining areas of common interest and areas where there are differences, a negotiating party may begin to identify alternatives which may maximize the value of a negotiated agreement to all parties—these are the so-called efficient or Pareto-optimal settlement alternatives (Raiffa, 1985; Goeltner, 1987). Using computer simulations, a party may then proceed to test these alternatives for substantive, rather than merely game-theoretic, efficiency.

Once this preliminary analysis is complete, the parties meet to develop an agenda of the most important issues that need to be negotiated and to determine, implicitly or explicitly, the ground rules that will be applicable to the negotiation. Clearly, a friendly and rewarding relationship early in a negotiation enhances the opportunity and payoff of subsequent cooperation. To move the Soviets away from their traditional distributive behavior, a U.S. firm should establish a cooperative atmosphere early on in the negotiation. The U.S. firm should focus on the underlying interests of the Soviets, and transform the negotiation from a bargaining over positions into a focus on interests. Because access to technology and hard currency are predominant Soviet interests, the U.S. firm can acknowledge the importance of these interests to the Soviets at the start of the negotiation. Decision tree models can be used to show how or why some interests that might appear important *a priori* are actually not critical, because their effects are dominated by other uncertainties. Without jeopardizing its interests, the U.S. firm should also consider releasing sufficient information to dispel any perception held by the Soviets that the negotiation is a competition between the parties.

The financial and economic viability of the venture are important and often the most critical interests of U.S. firms. To properly evaluate these interests, substantial information must be obtained from the Soviets. The Soviets may be reluctant to release this information for many reasons, including their unfamiliarity with Western concepts of finance and economics, their inability to determine how the Western partner will use the information or what the information might imply about the feasibility of the venture, and the natural tendency of distributive negotiators to withhold information for strategic and tactical reasons. It is here that computer models and modeling techniques offer the greatest potential. The U.S. firm might suggest that the parties use a set of computer models to develop a common database of information from which the parties can determine the feasibility of the joint

venture. This tactic immediately shifts the negotiation from a distributive bargaining orientation over issues into a joint problem solving exercise in search of information. For such a proposal to be accepted by the Soviets, the models that are to be developed must be (Messina, 1988):

1) applicable to their interests;
2) accepted as truthful;
3) adaptable to the problems at hand; and
4) based on accessible methodologies and technologies.

Once a common database is developed, the parties can begin to negotiate the issues. These negotiations should focus on the creation of value by expanding and, ideally, maximizing the potential opportunities for gain for all of the parties. As a beneficial side effect, the joint use of computer models may contribute to a more cooperative, collaborative exchange of information between the parties. Before deciding what to do, the parties should generate potential solutions through so-called "brainstorming sessions." These proposed solutions can then be jointly tested and evaluated using simulation models. While not always successful (see Samarasan, 1988), the process of working jointly and explicitly to create solutions may limit distributive actions to claim value.

The Western firm should use these and other integrative bargaining tactics and strategies to transform the inherent distributive motivations of the Soviets into a more cooperative search for an agreement which meets the interests of all parties to the negotiation. In this connection, it is important to note that negotiation of a joint venture agreement is only the beginning of a long and complicated transaction. Whether the terms of the agreement are fulfilled depends upon the character of the relationship between the parties. Joint ventures are long-term arrangements. To ensure continuing success, the establishing agreement must be self-executing in one very important sense: it must satisfy by its distribution the interests of all of the affected parties. Negotiators, therefore, must not lose sight of the interests of their future partners.

More empirical research is necessary to determine the effectiveness of negotiation theory and process and computer modeling techniques in support of complex joint venture negotiation. Unfortunately, the small number of actual joint venture negotiations that have been studied poses empirical difficulties. This situation may soon change, however, as the number of ventures grows and as researchers begin to initiate programs to study these activities. The hypothesis of this work, which is partly supported by existing empirical data but which requires additional testing, is that the integration of negotiation theory, group decision-making process, and computer modeling techniques offers a set of powerful tools to support complex joint venture negotiation.

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